

CLAIMS

1. A combination fitting for regulating fluid flow within generally cylindrical chamber defined in a fluid control apparatus, said fitting comprising:

a generally cylindrical member defining a bore therethrough,

a first end of the bore in fluid communication with a pump outlet;

a second end of the bore in fluid communication with a discharge port,

said member mounted within said chamber and having a first end and a second end, and

at least one channel defined in a portion of the first end of said member extending radially from the bore and in fluid combination.

2. The combination fitting of claim 1 wherein said at least one channel further comprises a pair of radially extending crossed channels defined on said first end of the member.

3. The combination fitting of claim 2 wherein said channels having a rectangular cross-section.

4. The combination fitting of claim 1 having two or more channels.

5. The combination fitting of claim 4 wherein the channels are regularly spaced about the bore.

6. The combination fitting of claim 5 having four channels regularly spaced at about 90° about the bore.

7. The combination fitting of claim 4 wherein the channels are irregularly spaced about the bore.

8. The combination fitting of claim 1 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of from about 14 mm² to about 18 mm².

9. The combination fitting of claim 1 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of from about 15 mm² to about 17 mm².

10. The combination fitting of claim 1 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of from about 16 mm² to about 16.5 mm².

11. The combination fitting of claim 1 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of about 16.3 mm².

12. The combination fitting of claim 1 wherein the at least one channel has a width and a length, and the ratio of the length of the at least one channel to the width of the at least one channel is from about 14:1 to about 5:3.

13. The combination fitting of claim 1 wherein the ratio of the length of the at least one channel to the width of the at least one channel is from about 10:1.5 to about 6:2.5.

14. The combination fitting of claim 1 wherein the ratio of the length of the at least one channel to the width of the at least one channel is about 7:2.33.

15. A combination fitting for regulating the flow of fluid having
a cylindrical member defining a bore therethrough,
a first end having a fluid port in fluid communication with the bore and
with an automotive power steering mechanism, and

5 a second end having a fluid port in fluid communication with the bore
and with an outlet port of a pump,

the improvement comprising at least one channel extending radially
from the bore defined at the first end.

16. The combination fitting of claim 15 wherein said at least one
10 channel further comprises a pair of radially extending crossed channels
defined on said first end of the member.

17. The combination fitting of claim 16 wherein said channels having
a rectangular cross-section.

18. The combination fitting of claim 1 having two or more channels.

15 19. The combination fitting of claim 18 wherein the channels are
regularly spaced about the bore.

20. The combination fitting of claim 19 having four channels
regularly spaced at about 90° about the bore.

21. The combination fitting of claim 18 wherein the channels are
20 irregularly spaced about the bore.

22. The combination fitting of claim 15 wherein the at least one
channel has a length and a width, wherein the length and the width of the at
least one channel define an area of from about 14 mm² to about 18 mm².

23. The combination fitting of claim 15 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of from about 15 mm² to about 17 mm².

24. The combination fitting of claim 15 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of from about 16 mm² to about 16.5 mm².

26. The combination fitting of claim 15 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of about 16.3 mm².

27. The combination fitting of claim 15 wherein the at least one channel has a width and a length, and the ratio of the length of the at least one channel to the width of the at least one channel is from about 14:1 to about 5:3.

28. The combination fitting of claim 15 wherein the ratio of the length of the at least one channel to the width of the at least one channel is from about 10:1.5 to about 6:2.5.

29. The combination fitting of claim 15 wherein the ratio of the length of the at least one channel to the width of the at least one channel is about 7:2.33.

30. A combination fitting for regulating fluid flow within generally cylindrical chamber defined in a fluid control apparatus, said fitting comprising:

a generally cylindrical member defining a bore therethrough,

a first end of the bore in fluid communication with a pump outlet,

a second end of the bore in fluid communication with a discharge port,

said member mounted within said chamber and having a first end and a second end, and

means defined in a portion of the first end of the member for regulating fluid flow.

31. A method of regulating fluid flow in a power steering fluid control apparatus comprising,

providing a hydraulic pump for the delivery of pressurized fluid through a pump outlet,

5 introducing pressurized fluid from the pump outlet to a fluid output chamber formed in a fluid control cylinder comprising a movable fluid control piston and a combination fitting having a fluid-receiving end, an internal bore therethrough and at least one channel extending radially from the bore disposed in the fluid receiving end of the fitting,

10 directing at least a portion of said fluid through the internal bore of said combination fitting to a power steering system,

detecting the pressure of the fluid with a pressure sensing orifice,

communicating said pressure through a passageway to a low pressure chamber located at an end of the piston,

15 regulating the position of the piston within the cylinder relative to the pressure of the fluid,

delivering excess fluid to a fluid bypass port

recirculating excess fluid to the pump.

32. The method of claim 31 wherein said at least one channel
20 further comprises a pair of radially extending crossed channels defined on said first end of the member.

33. The method of claim 32 wherein said channels having a rectangular cross-section.

34. The method of claim 31 having two or more channels.

35. The method of claim 34 wherein the channels are regularly spaced about the bore.

36. The method of claim 35 having four channels regularly spaced at about 90° about the bore.

37. The method of claim 34 wherein the channels are irregularly spaced about the bore.

38. The method of claim 31 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of from about 14 mm² to about 18 mm².

39. The method of claim 31 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of from about 15 mm² to about 17 mm².

40. The method of claim 31 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of from about 16 mm² to about 16.5 mm².

41. The method of claim 31 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of about 16.3 mm².

42. The method of claim 31 wherein the at least one channel has a width and a length, and the ratio of the length of the at least one channel to the width of the at least one channel is from about 14:1 to about 5:3.

43. The method of claim 31 wherein the ratio of the length of the at least one channel to the width of the at least one channel is from about 10:1.5 to about 6:2.5.

44. The method of claim 31 wherein the ratio of the length of the at least one channel to the width of the at least one channel is about 7:2.33.

45. A combination fitting for regulating fluid flow within generally cylindrical chamber defined in a fluid control apparatus, said fitting comprising:

a generally cylindrical member defining a bore therethrough,

a first end of the bore in fluid communication with a pump outlet;

a second end of the bore in fluid communication with a discharge port,

said member mounted within said chamber and having a first end and a second end, and

a pair of crossed channels extending radially from the bore defined on said first end of the member.

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46. A combination fitting for regulating fluid flow within generally cylindrical chamber defined in a fluid control apparatus, said fitting comprising:

a generally cylindrical member defining a bore therethrough,

a first end of the bore in fluid communication with a pump outlet;

a second end of the bore in fluid communication with a discharge port,

said member mounted within said chamber and having a first end and a second end, and

at least two channels extending radially from the bore defined on said first end of the member,

wherein the channels have a length and a width and an area defined by the length and the width of from about 14 mm² to about 18 mm².

47. The combination fitting of claim 46 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of from about 15 mm² to about 17 mm².

48. The combination fitting of claim 46 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of from about 16 mm² to about 16.5 mm².

49. The combination fitting of claim 46 wherein the at least one channel has a length and a width, wherein the length and the width of the at least one channel define an area of about 16.3 mm².